Measuring Habitat Characteristics in Golden-winged Warbler Territories:

What's important and how do we quantify it?

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Range-wide Golden-winged Warbler Conservation Initiative

- Goals/objective statement from NFWF proposal

  "The overall goal of this project is to document Golden-winged Warbler population sources/sinks and to associate demographics with habitat characteristics"

- In essence, what we are attempting to do is use golden-winged warbler demographics to identify high quality habitat.

Demographics Aspects

-Territory Density

-Nesting success

-Genetics

- **Missing an opportunity to relate these hard-earned demographic data with meaningful habitat characteristics.**

- **Ultimately, lowering our chances of synthesizing these relationships into meaningful habitat prescriptions.**

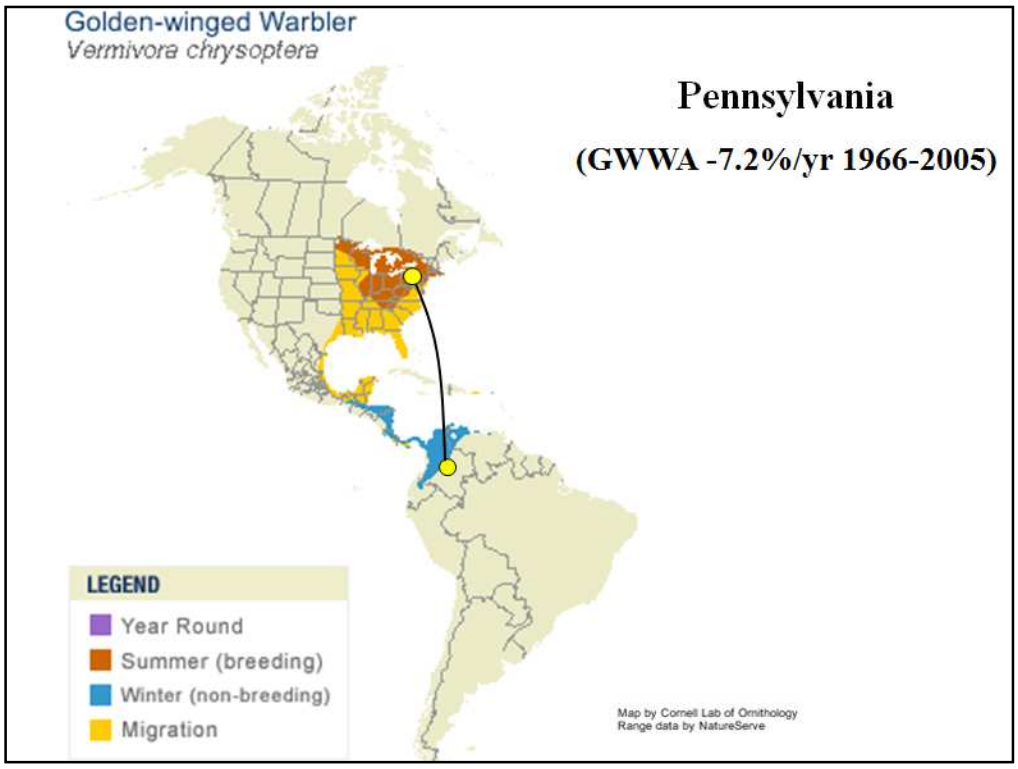
Quantifying Habitat Characteristics is Difficult

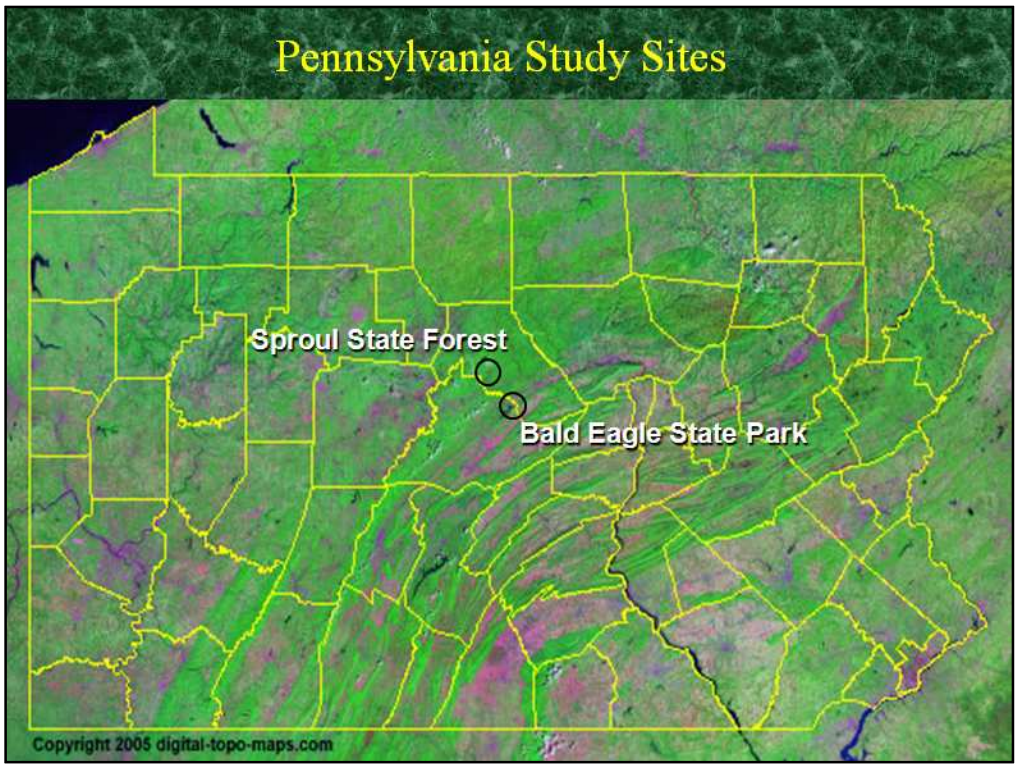
It takes a lot of thought:

Like many studies of wildlife/habitat relations we are presented with the challenge of:

- Identifying habitat features that are characteristic of high quality habitat.
- Measuring these features while walking the fine line between effectively sampling a site (data quality) and sampling enough sites (data quantity: sample size)

Golden-winged Warbler Conservation Initiative: Pennsylvania


Golden-winged Warbler
Vermivora chrysoptera
Pennsylvania
(GWWA -7.2%/yr 1966-2005)
LEGEND
Year Round
Summer (breeding)
Winter (non-breeding)
Migration
Map by Cornell Lab of Ornithology
Range data by NatureServe


Pennsylvania Study Sites
Sproul State Forest
Bald Eagle State Park
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Bald Eagle State Park

(GWWA, BWWA, Hybrids)

- Ridge and Valley Physiographic Province
- 210-245 m (700-800 ft)
- a mosaic of fragmented forests, scrub-shrubland, managed grasslands, and powerline rights-of-ways
- agricultural and residential land uses dominate the surrounding landscape.

Sproul State Forest

(GWWA only)

- 112,000 ha public forest land
- Mountainous High Allegheny Plateau
- 610m (2000 ft)
- dominated by mature forests and the surrounding landscape is predominately 80-100 years-old northern hardwood or dry oak forest.
- GWWA are restricted to regenerating clearcuts, gas well sites, and portions of a 4000 ha area that burned in the early 1990s.

Bald Eagle State Park
• Not only do these two study areas occur in very different landscape contexts, plant communities occupied by GWWA also differ considerably

Bald Eagle State Park
Drier sites: autumn-olive, multi-flora rose, and honeysuckle
© Leonard Hamilton

Bald Eagle State Park
Wetter sites: dogwood and viburnum

Sproul State Forest

Sapling/shrubs: Red maple and sassafras

Sproul State Forest
Black locust snags and Rubus spp.

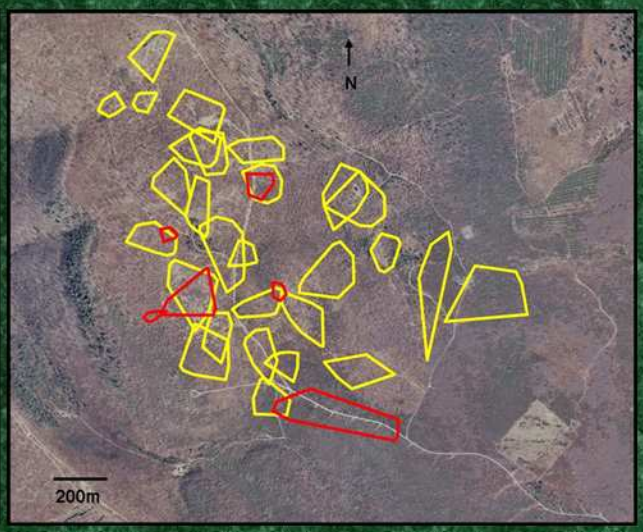
Sproul State Forest

Blueberry-huckleberry, sweet-fern, and mountain laurel dominate ground layer with scattered areas of forbs & grasses

Sproul State Forest
Rubus spp. / forbs/ grass ground layer

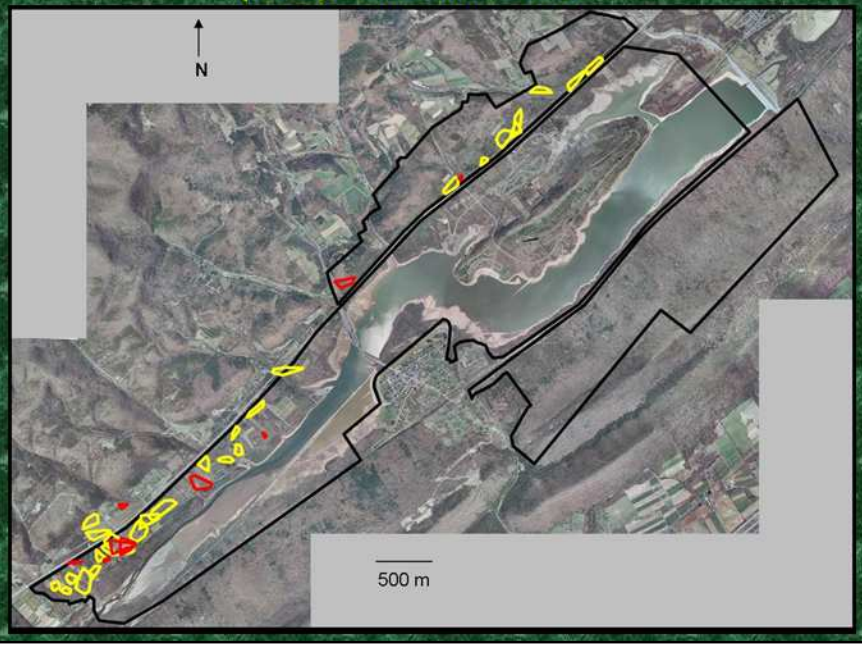
Territory mapping-SSF

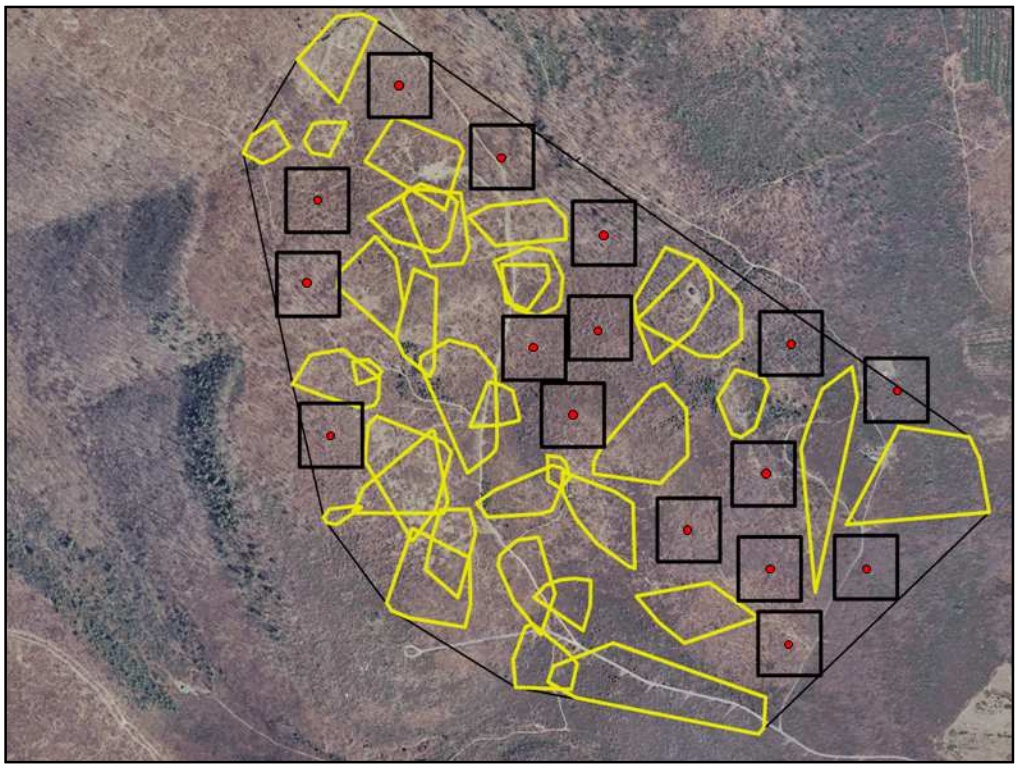
(1 May – late June 2008)



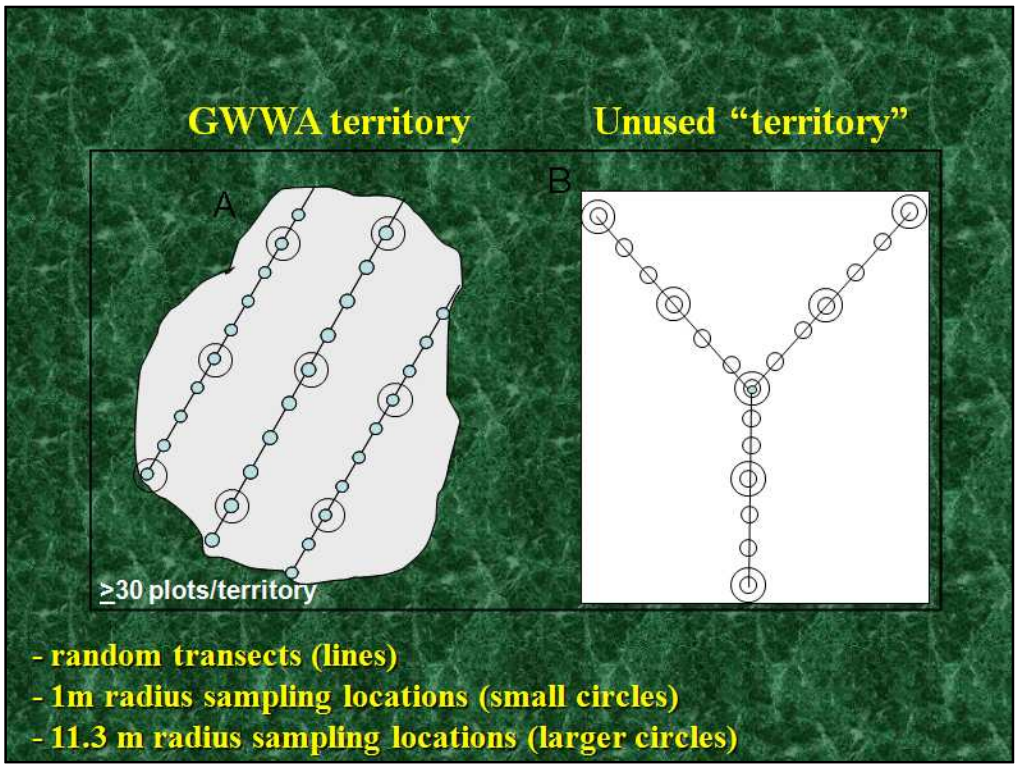
Territory mapping-BESP

(1 May – late June 2008)





Habitat Sampling
(late-June - mid-July)


GWWA territory
Unused "territory"
A
B
≥30 plots/territory
- random transects (lines)
- 1m radius sampling locations (small circles)
- 11.3 m radius sampling locations (larger circles)

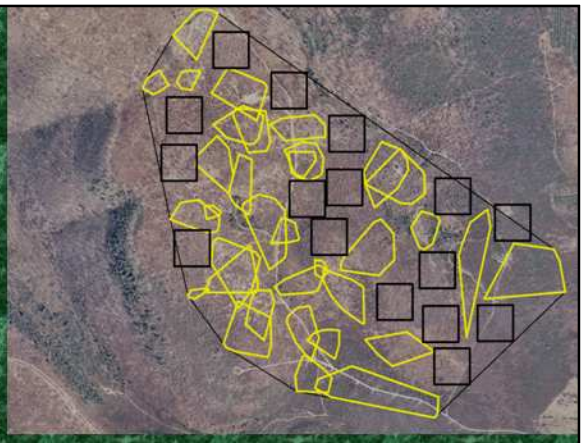
Habitat features

- 1m radius circle
- percent cover
  - Grasses
  - Forbs
  - Ferns
  - Blackberry
  - Huckleberry/blueberry
  - Sweet-fern
  - Mountain laurel
  - Shrubs < 2m
  - Shrubs >2m
  - Saplings (<10cm dbh)
  - Tree canopy (>10cm dbh)
- distance to micro-edge.

- At every 5th sampling point
  - number of "in" trees using a 2.5m^2/ha prism
  - number of snags within 11.3 meters
  - distance to closest shrub (<2m tall)
  - distance to closest shrub (>2m tall).

0=0%, 1=1-3%, 2=4-15%, 3=16-33%, 4=34-65%, 5=66-100%

Analyses



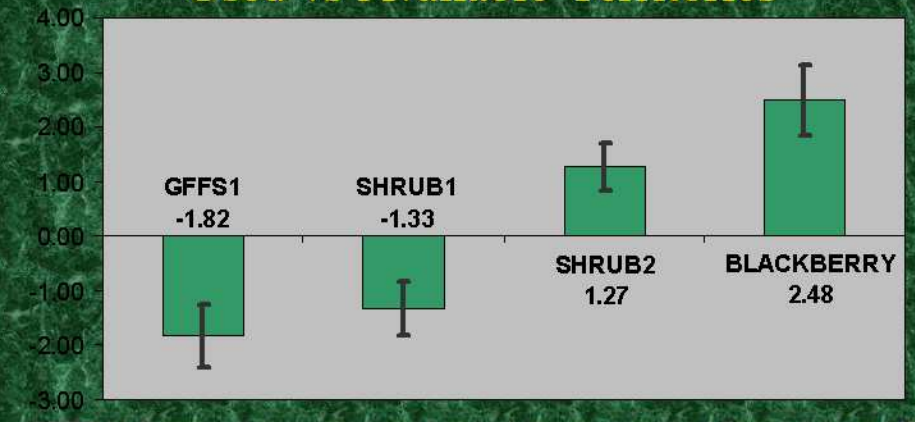
- Logistic Regression
  - Used vs. Available
- Principle Component Analysis
  - within GWWA territories at BESP (n=27)
  - within GWWA territories at SSF (n=29)
  - within GWWA territories Combined (n=56)

Habitat Measures with the Least Variation (Based on PCA)

BALD EAGLE (n=27)	SPROUL (n=29)	COMBINED (n=56)
Shrub <2m cover	**Shrub <2m cover**	Forb cover
Dist. micro-edge	**Dist. shrub >2m**	Blackberry cover
Tree count	**Blackberry cover**	Dist. shrub <2m
Tree cover	**Snag count**	Dist. shrub >2m
Sapling cover	**Dist. shrub <2m**	Shrub <2m cover
Dist. shrub < 2m	**Sapling cover**	Fern cover

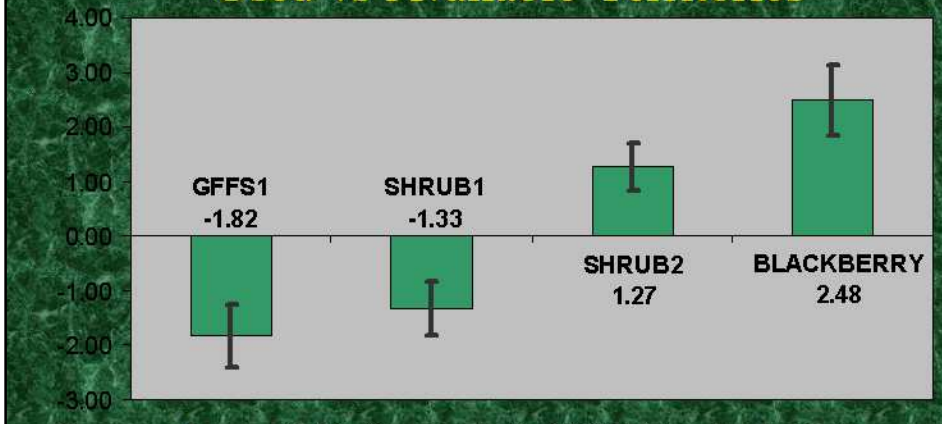
- These are the variables that contributed most to the components that varied least within GWWA territories
- Bolded variables were those that **did not** also vary least outside of GWWA territories

Logistic Regression
Used vs Available Territories



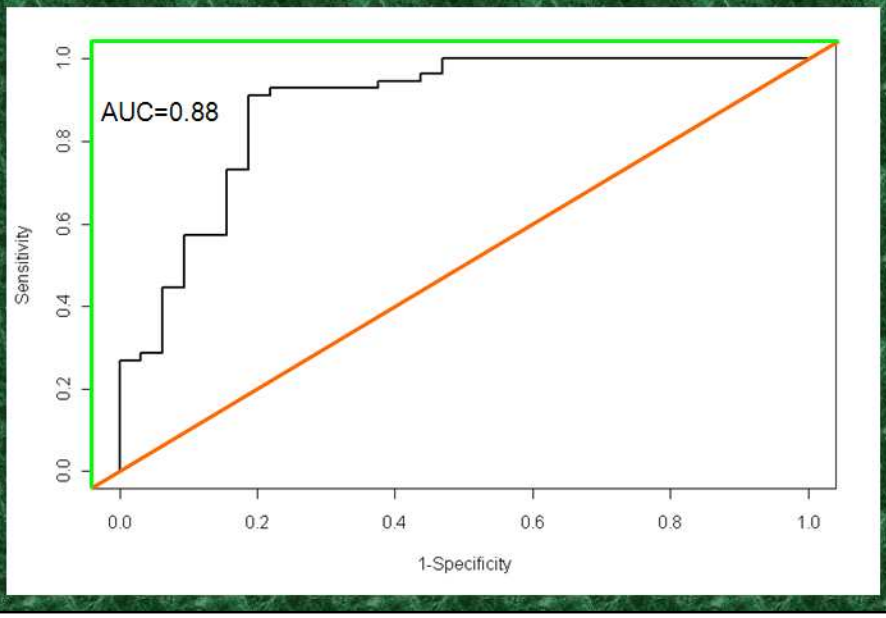
- GFFS1- Composite variable contrasting the amounts of Grass (-), and Forbs (-) with Ferns (+) and Saplings (+)
- Shrubs 1- Composite variable contrasting shrub counts (-) and shrub distance from transects (+)
- Shrub 2- Composite variable contrasting counts of shrubs with heights less than 2m (+) with counts of shrubs with heights greater than 2m (-)

Logistic Regression
Used vs Available Territories



- Compared to available "territories", GWWA territories had:
  - more grasses and forbs and less ferns and saplings
  - more shrubs and those shrubs were closer to the transect
  - More shrubs <2m tall and less shrubs >2m tall
  - More blackberry

Logistic Regression Goodness of Fit
(Area Under the ROC Curve)



Apparently important habitat features in PA

PCA

- Distance to micro-edge (BESP)
- Sapling cover (BESP)
- Snag count (SSF)
- Distance Shrub >2m (SSF)
- Blackberry cover (SSF)
- Distance Shrub >2m (combined)
- Blackberry cover (combined)

Logistic regression

- Grasses and forbs (more)
- Ferns and saplings (less)
- Shrub cover <2m tall (more)
- Shrub cover >2m tall (less)
- Blackberry (more)

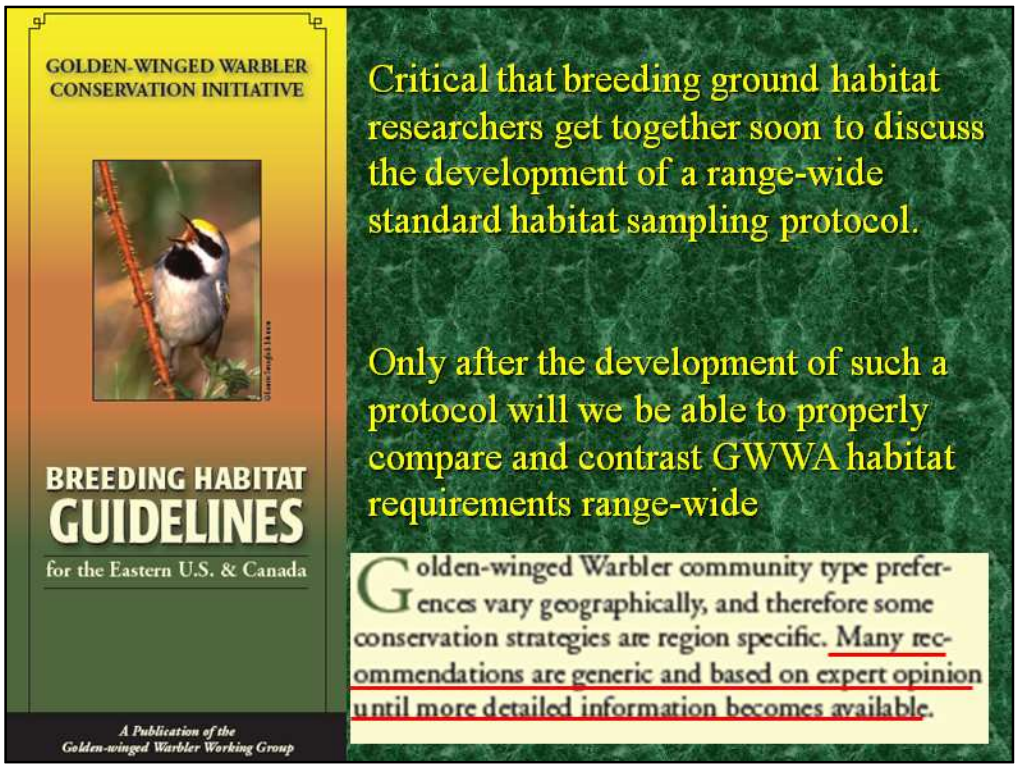
Consistent for both analyses

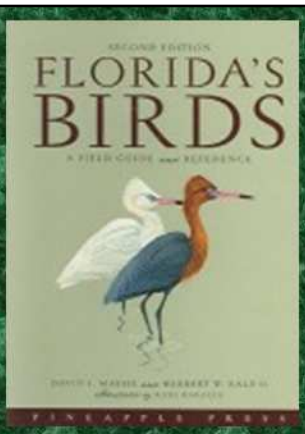
- Distance Shrub >2m
- Blackberry cover
- Saplings
- Forb

Going forward, What other variables should we quantify?

- Develop a metric that quantifies "patchiness"
- Include metric that quantifies forest edge

•Hire at least one technician with strong botanical background


GOLDEN-WINGED WARBLER
CONSERVATION INITIATIVE
BREEDING HABITAT
GUIDELINES
for the Eastern U.S. & Canada
A Publication of the
Golden-winged Warbler Working Group
Critical that breeding ground habitat researchers get together soon to discuss the development of a range-wide standard habitat sampling protocol.
Only after the development of such a protocol will we be able to properly compare and contrast GWWA habitat requirements range-wide
Golden-winged Warbler community type preferences vary geographically, and therefore some conservation strategies are region specific. Many recommendations are generic and based on expert opinion until more detailed information becomes available.

Thanks
Mitch LeSage
Bryan Tom
Andrea Wadsworth
Angelo Manifest
John Ferrara-BESP
GOLDEN-WINGED WARBLER
WORKING GROUP
DCNR
National Fish and Wildlife Foundation
RUFFED GROUSE SOCIETY
IUP

Dr. David Maehr (1955-2008)